A Model for Facilitating Field Experience in a Technology-Enhanced Model Pedagogical Laboratory

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Abstract

This paper presents a model for implementing a field experience program in a technology-enhanced pedagogical laboratory where teacher candidates practice and reflect on theory-based instructional strategies. The model consists of three steps: teacher candidate preparation, laboratory experience, and reflection. Teacher candidate preparation provides candidates with content, pedagogical, and technological knowledge needed to facilitate student learning. Laboratory experience offers opportunities for candidates to practice teaching in a technology-enhanced, student-centered learning environment. Reflection is a phase intended for the candidates to discuss and reflect on their facilitation experience. The paper first presents a conceptual framework that guides the development of the model. Then, it describes the model and illustrates it with an example. Last, it discusses present research and future directions related to the model.

Introduction

The contemporary vision of technology integration focuses on technologies as tools to transform education. Hooper and Rieber (1995) present a model of technology adoption in which teachers may progress through five developmental phases: familiarization, utilization, integration, reorientation, and evolution. At the familiarization and utilization phases teachers gain exposure to a technology and try out the technology in the classroom. As they gain more experience teaching with the technology, they may consciously integrate the technology into the classroom to the extent that they cannot function well without the support of the technology. Some of them may progress into the reorientation and evolution phases, in which they change their beliefs and practice toward student-centered, constructivist learning and continue to incorporate the latest understandings of how people learn. Similarly, Becker (2001) describes how we, as a field, have progressed from focusing on computer skills and curriculum integration to using technology as a tool for educational reform. He maintains that "the final and critical piece may yet turn out to be teachers' philosophies of learning and teaching and whether they can be brought around to be supportive of constructivist applications of computer technology" (¶3). Similarly, Ertmer (2005) argues that many of the conditions for technology integration already exist; the final barrier that is slowing the progress of technology integration is teacher's beliefs. Teacher candidates have already developed a stable system of beliefs on teaching and learning upon entering college (Pajares, 1992). They view teaching as a process in which teachers pass on knowledge for students to memorize (Brookhart & Freeman, 1992; Richardson, 1996; Wideen, Mayer-Smith, & Moon, 1998). This belief prevents them from adopting a constructivist view of technology integration.

Teacher education programs typically have little impact on changing teacher candidates' beliefs (Wideen et al., 1998). Reviewers (Wideen et al., 1998) argue that the failure of teacher education programs in impacting teachers' beliefs might be caused by the didactic nature of the programs; in fact, even programs that preach progressive education may not teach the way they preach. New approaches to teacher education are needed to transform teachers' beliefs. The purpose of this paper is to present a field experience model that is intended to challenge teacher candidates' beliefs about teaching, learning and technology integration. This model may inform teacher educators on how to design field experience programs to affect change in teacher candidates' beliefs. A couple of exploratory studies (Lai, Ma, Williams, & Prejean, & Ford, in press; Ma, Lai, Williams, Prejean, & Ford, in press) have been conducted to evaluate the effectiveness of this model. Summary of existing research on this model is presented toward the end of this paper.

Affecting Change in Teachers' Beliefs: A Conceptual Framework

Theory and research on teacher learning suggests various strategies to promote change in teachers' beliefs. Three key components are common to these strategies: experience, reflection, and support. The first component includes providing both personal and vicarious experiences (Ertmer, 2005) in which teacher candidates either practice the use of technology to facilitate student-centered learning or observe other teachers' technology integration practice. Teacher candidates should be given the opportunities to practice teaching with technology in all teacher education courses and field experience (Mims, Polly, Shepherd, & Inan, 2006; Moursund & Bielefeldt, 1999). In addition, vicarious experiences are also important. Teacher candidates should observe how other teachers, especially experts, teach with technology. The observation can be in person or through electronic means such as text- or multimedia-based case studies (Ertmer, 2005; Krueger, Boboc, & Cornish, 2003; Wang, Means, & Wedman, 2003).

Educational theorists have long recognized the importance of reflection in teacher education (Schön, 1987; Shulman, 1987). Reflection is a key process during which a teacher "looks back at the teaching and learning that has occurred, and reconstructs, reenacts, and/or recaptures the events, the emotions, and the accomplishments. It is that set of processes through which a professional learns from experiences" (Shulman, 1987, p. 19). Teacher educators have adopted various strategies and tools to encourage and guide teacher reflection (Lai & Calandra, 2007). Some common strategies include reflective journal writing, development of portfolios, and classroom discussions. Recently, electronic tools have been adopted to promote teachers' reflective practice, including e-mail, e-journals, weblogs, bulletin/discussion boards, chat rooms, listserv, and digital video.

Experience and reflection alone are inadequate to facilitate the change of beliefs; various support mechanisms should be in place to provide teacher candidates with information and materials, as well as social-cultural support to facilitate reflection and belief change. New materials, methods, and strategies should be made available to provide the new information and knowledge that teachers need to change their

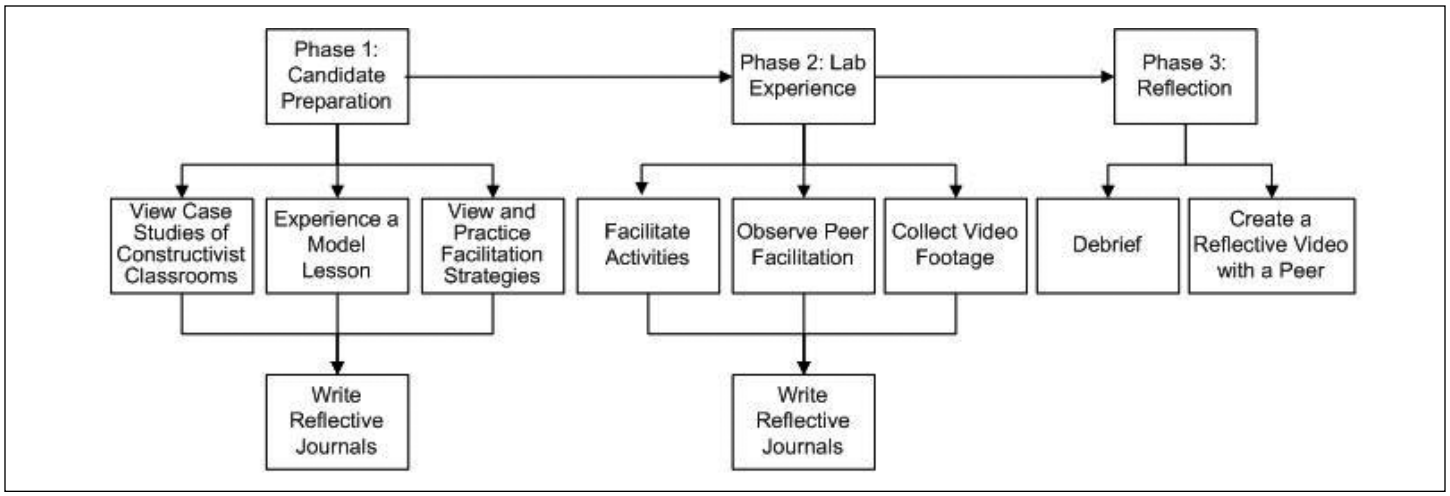

Figure 1: Field experience in a pedagogical laboratory: A process.

way of thinking and teaching (McAlpine & Weston, 1999; Orrill, 2001). Social-cultural support is critical to shaping teachers' beliefs and practice. Social-cultural support can be provided by developing communities of teachers who share values and opinions, discuss new methods and strategies, and support each other in taking the risk of changing their practice (Ertmer, 2005). In the communities, there is collaboration and support at the group level or one-on-one support among peers and between experts and novices (Orrill, 2001). Social-cultural support is also important within teacher education programs. Moursund and Bielefeldt (1999) advocate that in these programs, faculty should model technology integrated teaching and mentor teachers should be provided to support and encourage teacher candidates as they practice teaching with technology in field experiences.

A Field Experience Model

In our teacher education program, we created a model pedagogical laboratory to impact teacher candidates' beliefs on teaching, learning, and technology integration. The model pedagogical laboratory is a concept advocated in a National Academy of Sciences report that synthesizes new findings on learning and presents a research agenda to improve teaching and learning (Brandsford, Pellegrino, & Donovan, 1999). One of the research and development areas for teacher education is to develop model pedagogical laboratories, in which teacher candidates experiment with the latest findings in learning and instructional theories by trying them out with students recruited from local schools. The laboratory provides teacher candidates with opportunities to work like scientists who try out new strategies, observe student learning, and reflect on the strategies. The laboratory has the following components: 1) a repository of model lessons and units as well as protocols of various teaching strategies; 2) an ongoing relationship with schools or Saturday programs which provide a source of K–12 students to be taught; 3) expert teachers to offer guidance and feedback to new teachers; and 4) a rich set of technology tools for beginning teachers to practice teaching with technology and to connect with outside communities of teachers and researchers.

The report from National Academy of Sciences (Brandsford et al., 1999) provides a rationale for developing pedagogical laboratories to support teacher education. It argues that when the graduates of teacher preparation programs start to teach in schools, their beginning experience in a classroom is typically overwhelming. To survive the experience, these new teachers frequently adopt the norms of operation in a school, and discard effective teaching methods learned from teacher education programs. This is problematic because the prevailing practice in schools falls short of the best practices taught in teacher education programs. The pedagogical laboratory may enable new teachers to see how an instructional approach plays out in a classroom, what problems may arise and what solutions may be effective. Such experiences may ease their transition to the school environment and help them better apply learning theories to their own teaching practice.

The model pedagogical laboratory that we designed is currently used for field experience by teacher candidates taking a technology integration course. In the past, the 10-hour field experience in this class primarily involved going to public and private schools to observe how classroom teachers use technology. The observations generally had limited impact on teacher candidates' learning of technology integration, because candidates often did not observe exemplary use of technology. To address this problem, we developed a field experience model that is applicable for different education majors in the technology integration course.

The field experience model that we designed includes the following phases: teacher candidate preparation, laboratory experience, and articulation and reflection (Figure 1). The first phase is teacher candidate preparation. The primary goal of this phase is to provide teacher candidates with content, pedagogical, and technological knowledge needed to facilitate the activities. Teacher candidates first review video case studies of constructivist classrooms to learn about the differences between constructivist and instructivist classrooms (Reeves & Reeves, 1997). Then, the expert teacher delivers a model lesson and the candidates experience the lesson as students. They observe how the expert teacher models the facilitation strategies and then practice these strategies with each other. The second phase is laboratory experience. It aims to offer personal experience to facilitate technology-enhanced, student-centered learning. Teacher candidates take turns to facilitate activities, observe their peer's facilitation practice, and collect video footage of their peers. They keep a reflective journal in both phases two and three. The third phase is articulation and reflection. It is intended for the candidates to reflect on their facilitation experience and at the same time to practice their technological skills in creating digital videos. After each facilitation experience, teacher candidates meet and discuss their experiences. Once the lab experience is completed, they create a reflective video with a peer.

Table 1 illustrates how the conceptual framework informed the design of our field experience model. We embedded the three components that are critical to affecting change in teachers' beliefs, including experience, reflection and support, in our model. For example, opportunities for acquiring both vicarious and personal experiences are available. Teacher candidates may gain vicarious experiences by viewing case studies of constructivist classrooms and observing peer facilitation. They obtain personal experiences by participating in the model lesson as a student

Table 1: Field Experience in a Pedagogical Laboratory: The Components

Experience	Reflection	Support
Vicarious:	Reflection journal	Model lesson materials
Video case studies	Video-based	Facilitation strategies
Peer observation	Reflection	Expert teacher modeling and
Personal:		coaching
Experience the model		Class discussions
lesson		Guide for reflection writing
Activity facilitation		and reflective video creation

as well as facilitating the model lesson as a teacher. Reflection is another component emphasized in the model. Teacher candidates are required to keep a reflection journal and to create a reflective video with a peer. A mechanism is in place to support their experience and reflection. For example, lesson plans and facilitation strategies give teacher candidates the resources needed to facilitate the activities. Expert teachers model best practices and give feedback and assistance to teacher candidates. Materials are provided to guide candidates' reflective writing and reflective video creation. Class discussions offer opportunities for candidates to share experiences and ideas as well as to provide encouragement and support to each other.

Digital Storytelling Field Experience

In this section, we illustrate the field experience model with an example. We designed a digital storytelling model lesson for use with children in grades K–3. We taught the model lesson to our early childhood education majors and guided them to facilitate the lesson when teaching a group of children.

We chose digital storytelling as the main activity for the model lesson, because literacy is a key area of development for children in grades K–3, and digital story telling provides a vehicle for developing literacy. Digital video production creates a learner-centered environment that encourages students to manipulate and communicate concepts and ideas with images, words, and sounds (Oostenink, Burns, & Williams, 2001; Riddle, 2004). We chose iMovie as the video editing tool, because it is affordable and easy to use. iMovie enables the user to create movies that contain the title, animated still images, and video clips. Special effects, such as the illusion of lightning, rain, and fog, can be used to enhance images and add drama to the story. iMovie's storyboard allows students to arrange video clips and still images in a strategic order. Transitions can be placed at specific locations to ensure a smooth change between scenes. Voiceovers can be recorded and sound effects and music can be placed in audio tracks. The sound level can be manipulated to enhance the audio with fade-in and fade-out effects. The finished video can be exported in formats with high or low resolutions.

The digital storytelling field experience, including candidate preparation, lab experience, and articulation and reflection, took candidates over four weeks to complete. Candidate preparation lasted two weeks, with a total of approximately eight hours. Laboratory experience took place on two consecutive Saturdays and lasted a total of six hours. Articulation and reflection took 10 hours in two and a half weeks.

Phase 1: Candidate Preparation

View Case Studies of Constructivist Classrooms

In order to address candidates' prior beliefs relating to the teaching and learning of young children, the university instructor asked candidates to compare their previous classroom experiences to a constructivist classroom described in an INTIME (2001) video case. This procedure took about an hour. The university instructor guided the candidates to question the concept of the teacher as the keeper of all knowledge and showed video clips of constructivist classrooms at a variety of grade levels and in multiple content areas. Candidates questioned whether teachers in the video clips were actually "teaching" because direct instruction was not given. The candidates discussed the role of the teacher in the constructivist classrooms and how that role may impact student learning.

Experience a Model Lesson

The model lesson is a language arts unit in which students learn writing and reading by developing story components in Kidspiration, writing scripts in Microsoft Word, and creating the multimedia story using iPhoto and iMovie. It is a student-centered learning unit; students are responsible for creating their stories and movies with the guidance from the teacher. It is the same lesson that teacher candidates will facilitate in the laboratory experience. The model lesson took about five hours during a period of a week and a half. There are three main tasks: prewriting activities, script writing and revision, and iMovie production.

Prewriting activities. A university instructor wrote the iMovie language arts lesson plan and modeled the facilitation of the activities as teacher candidates experienced the lesson as students. The unit was introduced with an iMovie video that illustrates a story on a bayou near an Acadian village. The university instructor led a group discussion of the movie's characters, plot, and setting to identify the key components of a story. Then, candidates developed their own stories by defining story characters, setting, and a sequence of events with the use of Kidspiration templates.

Storyboard development. Candidates created the storyboard for the iMovie in a Microsoft Word template created by the university instructor. The template allows learners to insert images, write the script that will be recorded as a "voiceover," and list the estimated time needed for reading each section of the script. Candidates took digital pictures, edited them in iPhoto, and inserted the images into the storyboard. Then, they analyzed the grammar and revised the storyboard to ensure that the story clearly communicated the plot. Finally, they practiced reading the script with expression to prepare for recording the "voiceover."

iMovie production. Candidates imported their images into iMovie and arranged them in the order specified by the storyboard. They animated the still images, recorded the voiceover, and added music, transitions, and effects. They adjusted the timing of images, transitions, voice, and music to ensure that audio and video are synchronized. Once they were satisfied with their movie, they exported and copied it to a CD.

View and Practice Facilitation Strategies

To prepare teacher candidates for the field experience, the university instructor modeled a list of facilitation strategies, compiled from theory and research related to student-centered learning (Hmelo-Silver & Barrows, 2006; Jonassen, 1999; Mevarech & Kramarski, 2003). The list includes not only general strategies such as questioning, modeling and providing motivational prompts, but also specific strategies to encourage reflection and guide group collaboration. The university instructor used strategies such as questioning and motivational prompts to guide the candidates' creation of characters, setting, and plot. While candidates were revising their scripts, the university instructor modeled strategies that promote active learning and reflection. For example, the university instructor asked the candidates to clarify their assumptions and to explain their thought processes, raising candidates' awareness of the story's ability to communicate the plot. While candidates were creating the iMovie, the university instructor modeled various technology skills needed to produce the movie.

During and after the lesson delivered by the university instructor, candidates analyzed the facilitation strategies modeled by the university instructor. They discussed how the strategies facilitated the process of story development, script writing, and iMovie production.

Candidates prepared for the field experience by practicing teaching the iMovie lesson to each other. They videotaped each other teaching with the use of the facilitation strategies and gave feedback to each other. The experience was intended to enable candidates to practice the strategies and to review technology skills required for the field experience. The entire facilitation strategies training took approximately two hours to complete.

Write Reflection journals

Candidates were prompted to write reflective journals describing how they learned to read and write when they were young and how their childhood classrooms were different from the constructivist classroom depicted in the video case. They were also encouraged to reflect on the model lesson taught by the university instructor. They wrote reflection journals as part of their homework.

Phase 2: Laboratory Experience

Facilitate Activities

The field experience took place in college of education laptop lab classrooms and consisted of two three-hour sessions on consecutive Saturdays. Candidates worked in pairs with two students in grades PK–3, and they took turns teaching and collecting video footages of their peer's teaching.

On the first Saturday, candidates facilitated the prewriting and the storyboard development processes. They guided their students to create story ideas, characters, and the story plot with the use of Kidspiration templates. Then they helped the children to use digital cameras to capture the images of their characters and the story setting. In preparation for taking the digital pictures, some groups of children chose to create their characters out of pipe cleaners, construction paper, or modeling clay. Some other groups chose to play the characters themselves and created construction paper costumes or brought stuffed animals and costumes from home. After uploading the images into iPhoto, candidates guided the children to analyze their pictures and identify the ones appropriate for their movie. Candidates helped the children write and revise their storyboard. For young children who could not write, candidates wrote the script based on children's dictation of the story.

On the second Saturday, candidates facilitated the iMovie production process. They guided the children to practice reading the script. For children who have not learned to read, candidates read the script to them and asked them to repeat. After the children reached fluency in reading their script, candidates helped them record the voiceover. Then, under the guidance of the candidates, the children compiled the images, voice, and music into an iMovie. At the end of the second Saturday, the groups gathered and shared their iMovies.

Observe Peer Facilitation and Collect Video Footage

With the Facilitation Strategies Note Taking Guide provided by the instructor, candidates observed and took notes of their partner's use of facilitation strategies. They collected video footages to document the use of strategies. The observation notes and video footages served as artifacts for them to reflect and discuss their facilitation experience.

Write Reflective Journals

After the laboratory experience, candidates wrote reflective journals of their experience as part of the homework. They described how they facilitated the activities, how the facilitation strategies worked for them, and their beliefs about teaching with iMovie and hands-on activities.

Phase 3: Reflection

Debriefing

After the field experience on each Saturday, candidates met at their regular class meeting time to debrief for an hour. They provided feedback to each other, discussed how the field experience went, what issues had arisen, and how issues were addressed. The debriefing sessions helped candidates identify issues and address them in a timely manner. For example, many candidates did not feel that students in grades PK–3 had the skills to use a computer, so they tried to control the computer during the field experience. This issue was brought up at the debriefing session after the first Saturday. The discussion prompted more candidates to give control of the computer to the students on the second Saturday. Many of them were surprised at children's abilities to use the computer and realized that they underestimated the children.

Video-based Collaborative Reflection

After the field experience, candidates spent four two-hour sessions working with a partner to create a reflective iMovie documenting their learning experiences in the pedagogical laboratory. They used the video footage and still images that they collected during candidate training and laboratory experience. They were prompted to describe and discuss any meaningful learning that occurred, such as the facilitation skills they acquired and the changes in their knowledge and beliefs related to teaching and learning.

Formative Evaluation and Future Research

A couple of formative evaluation studies of the field experience model suggest that it has the potential to impact teacher candidates' learning and to affect changes in their beliefs. Interested readers may refer to two research reports for details (Lai et al., in press; Ma et al., in press). In the following we briefly summarize the studies.

Study 1

The first study (Ma et al., in press) was conducted in the fall semester of 2006. Qualitative data, including teacher candidates' reflective journals and follow-up interviews, were gathered from 32 candidates to investigate the challenges teacher candidates encountered, the impact the program had on their learning and beliefs, the support and resources needed to support their growth, and the various factors that might have contributed to their different experiences and perceptions in the pedagogical laboratory.

Candidates found the personal experience in facilitating the lesson extremely valuable; they asked for more field experience opportunities like this in other teacher education courses. They began to appreciate the value of student-centered constructivist learning, and acknowledged that it may take much more than one field experience or one semester for them to change their beliefs and acquire the knowledge and skills necessary for facilitating student-centered learning. Candidate preparation was crucial to the success of the field experience. This model has evolved from our previous implementations of the field experience program in which candidates received much training on the technology skills but little preparation related to student-centered pedagogy and facilitation strategies. We noticed that candidates who received training prescribed by this field experience model seemed to be more successful and positive than those in our previous field experience programs.

Study 2

The second study was carried out in the fall semester of 2007 (Lai et al., in press). To quantify the impact of the pedagogical laboratory experience, a 54-item instrument, Teachers' Beliefs Regarding Technology Use Survey (TBTUS) (Park & Ertmer, 2007), was given to 24 teacher candidates both before and after the pedagogical laboratory experience. A 15-item teacher perception survey was also given to teacher candidates at the end of the pedagogical laboratory experience. In addition, we gathered qualitative data, including teacher candidates' reflective journals and follow-up interviews.

We found that the pedagogical laboratory experience had no statistically significant impact on most of the beliefs measured by TBTUS. The findings were contrary to a candidate perception survey in which 65% of the candidates agreed that the pedagogical laboratory experience changed their beliefs on teaching and learning. The only beliefs in TBTUS that were significantly changed were the non-learner-centered beliefs about learners (NLB-L). Instead of assuming more student-centered beliefs about learners, teacher candidates strengthened their non-learner-centered beliefs about learners after completing the field experience.

Consistent with the teacher perception survey, qualitative analysis of candidates' reflective journals and interviews indicated that the pedagogical laboratory experience did have an impact on teacher candidates' beliefs. Quite a few teacher candidates commented on the values of technology in engaging students and the complexity and problems involved in using technology. One third of candidates discussed issues related to student-centered learning, including issues of teacher roles and control. However, most of the discussions in the reflective journals and interviews were not those relevant to the beliefs measured by TBTUS. For most of the candidates, the field experience was one of their first teaching experiences. As new teachers, they encountered various problems and learned that teaching does not always occur as planned. They needed to stay positive and deal with various classroom management issues and modify the lesson to meet the needs of the learners. The problems they encountered in the field experience might have exposed them to the difficulties in teaching and strengthened some non-learner-centered beliefs about learners.

To our disappointment, the impact of the pedagogical laboratory was not significant on an objective instrument TBTUS. The qualitative data suggests that changes might be incremental and TBTUS might not be sensitive to changes that occurred after 22-hours of treatment, with only six hours of actual teaching experience. Moreover, unlike vicarious experiences, personal teaching experiences in the pedagogical laboratory were different for each candidate because each group worked with different children and encountered different problems, so much of what they learned during the experience were unrelated to the beliefs that were measured by TBTUS.

This study suggests that personal field experience was powerful. Pre- and post findings on TBTUS indicated that the experience might have enhanced candidates' non-learner-centered beliefs. Although student-centered learning was advocated to candidates in the teacher education program and emphasized in the technology integration course, various barriers in implementing student-centered learning in the field experience might have discouraged some candidates from adopting this approach. It may be that some teacher candidates claimed to possess student-centered learning beliefs because they perceived student-centered learning to be the correct answers in the teacher education program, yet in reality their knowledge or beliefs were not built on experience and deep reflection. If candidates are not trained on how to address various issues in student-centered learning, they may soon resort to traditional approaches to teaching once they graduate from the program.

Future Research

We will continue to evaluate and refine this field experience model in order to affect change in teacher candidates' beliefs and competency in integrating technology to facilitate student-centered learning. In our future research, we plan to evaluate how well we are achieving those goals. In the short-term, we intend on evaluating the intermediate outcomes, which are related to the three core components of the field experience model: experience, reflection, and support. How effective are the various types of experiences provided by the field experience? Our previous research (Lai et al., in press; Ma et al., in press) reveals that candidates appreciated the personal facilitation experience, but few comments were made regarding the vicarious experiences, including video case studies and peer observation. Future studies are needed to examine these components. Reflection is another area that needs our attention. Many of the reflective journals and reflective iMovies produced by the candidates were shallow and unfocused. Candidates usually described what happened and expressed their personal beliefs yet provided limited elaboration or insights. More efforts will be made in the future to support candidates' reflective practice and to evaluate the quality of their reflective journals and reflective iMovies. Our previous studies indicate that the candidate support mechanism was generally successful, but we have limited understanding of the effectiveness of individual components of the support mechanism (Table 1), including lesson plans, facilitation strategy training, modeling and coaching, class discussion, and support for reflection journal writing and reflective video creation. The support mechanism is critical to facilitating belief changes in the direction desired. We need to provide candidates with training on how to deal with various issues in student-centered learning to facilitate effective learning. Future research is needed to evaluate and refine these components.

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